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March 4, 2020

Mr. Michael Scott, Director, Division of Waste Management
Mr. Danny Smith, Director, Division of Water Resources
North Carolina Department of Environmental Quality
217 West Jones Street
Raleigh, NC 27603

Dear Mr. Smith and Mr. Scott:

I'm writing with a few comments related to the Corrective Action Plan (CAP) offered by Chemours for the PFAS problem at and around their facility in Bladen County, NC. My comments here focus on "off-site" aspects of groundwater contamination, outside the Fayetteville Works property.

Pilot Program for Deeper Private Water Supply Wells
From the DEQ web site, I understand that the Revised Consent Order requires that Chemours provide permanent drinking water supplies (in the form of either a public waterline connection or whole building filtration system) for those with drinking water wells having GenX above 140 parts per trillion, and provide under-sink reverse osmosis (RO) drinking water systems for well owners with combined concentrations of certain PFAS above 70 parts per trillion or concentrations of certain individual PFAS above 10 parts per trillion.

While granular activated carbon (GAC) filters and RO systems can be effective at removal of PFAS from water, it seems possible that some wells drawing in PFAS-contaminated groundwater may continue to do so for many years, perhaps decades, requiring a very long-term commitment to careful maintenance of such in-home filtration systems for the protection of human health. Also, at a February 26, 2020 public forum with researchers and Chemours area residents at Fayetteville State University, there was mention of issues with microbial growth in GAC systems, and of routing of PFAS-concentrated "rejectate" (waste water) from RO systems into septic systems (and thus back into the ground).

As an alternative to in-home treatment systems, I suggest that DEQ consider requiring Chemours to fund a pilot program that involves drilling deeper private or shared community water supply wells that reach beneath contaminated groundwater, to provide clean groundwater to homes that currently have wells contaminated with PFAS. Such wells could be drilled into the Upper Cape Fear Aquifer, or, with caution, clean deeper parts of the Black Creek Aquifer in some areas (some parts of this aquifer do have PFAS contamination), or perhaps other suitable subsurface formations.

I think a useful pilot program would utilize only high-quality professional drillers, and have oversight from groundwater experts at DEQ and NC universities. No bridging of confining units with gravel packs would be allowed; where a borehole runs through a confining unit, grout would be required in and above the annual space, to ensure this space does not become a conduit for inter-aquifer movement of PFAS. I imagine a pilot program could begin with 10 or so carefully drilled and installed wells. If it is successful in supplying residents with good quality groundwater that is essentially PFAS free or extremely low in PFAS, the program could be expanded at Chemours expense.

At the February 2020 symposium I mentioned above, one area resident said she had asked Chemours to provide a deeper well, and her request was refused. A second resident said she had obtained quotes for a deeper water supply well, with estimates in the range of $15k. If such wells are successful, they could represent an essentially permanent solution for residents with shallower contaminated wells, possibly without the decades-long complication of in-home treatment. I can't confirm the resident's estimate of $15k; if each well cost twice that much (which seems unlikely), even 100 wells would cost only $3 million, a relatively small sum for Chemours in the context of the overall PFAS problem and the solutions they are pursuing.

The proposed program could be seen as meeting Chemours' objective to "Provide replacement drinking water" (page 54 of the CAP). According to page 76 of the CAP, "Chemours is working with NCDEQ to identify locations where public water is available and can be provided to private residents for less than $75,000 per affected party". Deeper wells may be cost-competitive relative to new connections to existing public water supplies.

Watershed-Scale Monitoring of PFAS Export

My understanding is that the CAP does not involve mitigation of stream export of PFAS into the Cape Fear River from tributary watersheds near Chemours (Georgia Branch, Willis Creek, and un-named tributaries on the east side of the river, all significantly contaminated with PFAS). It seems possible there could be some monitoring of PFAS in some streams, but the language in the CAP is not very clear on this, and even if streams are included in the "baseline monitoring" (page 86 of the CAP), it seems that it may be for only one year.

One of the most important practical questions concerning the "off-site" groundwater contamination is, assuming the source (mainly air emissions) has been nearly eliminated, how long will it take for the PFAS contamination to flush out of the groundwater system by groundwater discharge into streams? The answer is not well known but it may be decades. In my opinion, considering the large scale of the contamination, it's in the best interest of the state and local residents to have an integrated large-scale measure of the rate of PFAS loss from the groundwater system, rather than rely only on point measurements at a limited number of wells. Stream export can provide such a measure.

I suggest that long-term stream discharge monitoring stations be established on Georgia Branch, Willis Creek, and at least one tributary on the east side of the Cape Fear River, and that these stations be used to collect continuous records of stream discharge (as at USGS gauging stations) and frequent measurements of PFAS in the stream water. Design, construction, and operation of the stations would be through experts at DEQ, USGS, and NC universities, at Chemours expense.

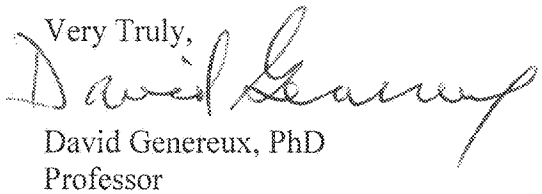
Each station would provide integrated watershed-scale data on the rate of PFAS export from the watershed (a good metric for the rate of PFAS discharge from groundwater), and the rate of change of PFAS export over time. This watershed-scale assessment of the resource would complement the information from point measurements at individual wells and provide what is likely the best indication of the overall rate of progress in recovery of the water quality in the affected groundwater systems.

Chemours is claiming enormous reductions in PFAS emissions to air in the last year or two, and if that is true and the clock has truly started on PFAS flushing from the groundwater, now is the perfect time to begin the suggested monitoring.

Collection of RO Rejectate

If the anecdotal information I've heard about RO system rejectate being routed to on-site septic systems is true, then I would suggest that there is a better way. I understand that the primary goal of an in-home RO system is to provide clean water with little or no PFAS to the residents, and it's not intended as an aquifer remediation project. On the other hand, if a relatively small but concentrated PFAS waste stream exists and can be easily captured (as with RO systems), it would seem disappointing to release it back into the aquifer, especially given the impact of this problem on residents and the state of NC, and the ready availability and proximity of a responsible party with means. A more desirable solution would seem to be Chemours-funded collection of all RO system rejectate, followed by responsible destruction of the waste through thermal oxidation or at least safe disposal through deep well injection.

Very Truly,



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